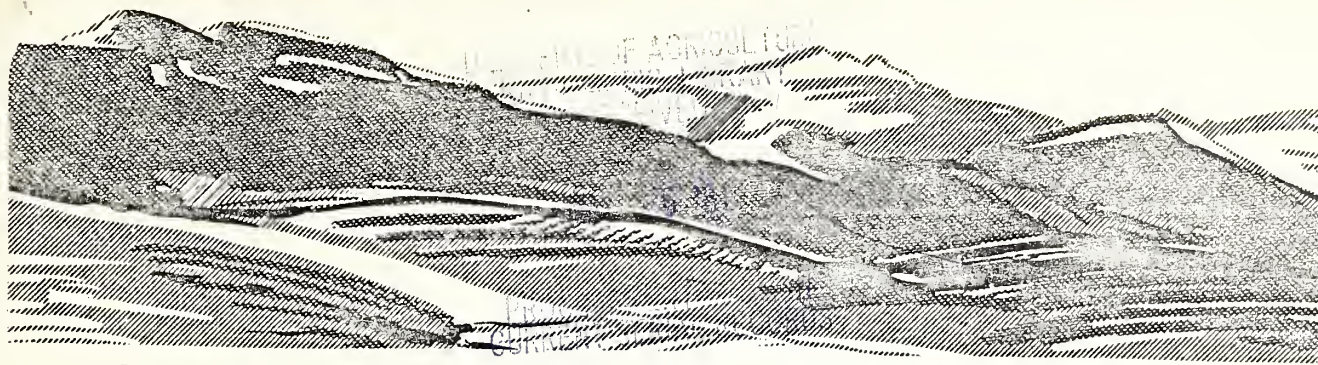


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RANGE IMPROVEMENT



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NOTES

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FOREST SERVICE — U. S. DEPARTMENT OF AGRICULTURE
INTERMOUNTAIN REGION — OGDEN, UTAH

STATEMENT OF PURPOSE

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This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "NOTES" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

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PROGRESS REPORT

The Effects of Fire on Vegetation and Wildlife on a Lodgepole Pine Burn in Chamberlain Basin, Idaho

By

T. A. Phillips*

Chamberlain Basin is located on the north edge of the Payette National Forest in Central Idaho. It is bounded on the north by main Salmon River, and on the east and west by the Middle and South Forks of the Salmon. Big Creek, a tributary of the Middle Fork, lies to the south of the Basin. Elevations range between 6000 and 9000 feet, and drainage is mostly to the east and northeast by way of Chamberlain Creek.

Vegetation Types

Chamberlain Basin supports extensive stands of timber. Ponderosa pine occurs in the Chamberlain Creek drainage at lower elevations; while at the middle and higher elevations, Douglas-fir and Engelmann spruce and subalpine fir are found. Fire has burned over much of the Basin, and all old burns in the middle and upper areas are occupied by extensive stands of lodgepole pine. Numerous meadows are scattered throughout the timber wherever openings occur. These range in size from less than an acre to more than 100 acres.

Wildlife

The Basin provides summer range for a sizable herd of elk and mule deer. White-tailed deer, moose, bighorn sheep, and mountain goats occur in lesser numbers. There are also good populations of large predators, birds, and small animals.

Study Area

In early September of 1966, lightning ignited a fire near Flossie Lake in the upper Chamberlain Creek area. The fire subsequently burned about 5500 acres of timbered land. This afforded an excellent opportunity to study plant succession and the effects of fire on big game habitat in the Basin. In mid-July 1967, such a study was initiated on a part of the burn area in the Game Creek drainage about three miles northwest of the Chamberlain Ranger Station. The study area is located on a small drainage that is tributary to Game Creek. This drainage runs roughly north and south and lies at an elevation of approximately 6600 feet. Slope gradients in the drainage range between 5 and 40 percent.

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Two transects were established a short distance inside the burned area. One transect was run on a bearing of north 66 degrees west from the point of beginning, while the bearing from the second transect was north 18 degrees east from the same point of beginning. Staked circular 4.8-square-foot plots were established along the transects at 50-foot intervals. Twenty plots were established on each transect. The following data were collected on the transects: species, production, species composition, percent ground cover, vegetation and litter, and percent bare ground.

Unburned Area

In order to obtain some indication of pre-burn vegetation, transects were run in an unburned area adjacent to the burn. The same information was gathered in this area as in the burned area, but plots were smaller (1.92 sq. ft.) and were not staked. Plot measurements were made in both the burned and unburned areas in 1967 and again in 1971.

The understory production on the unburned area was 1000 pounds per acre air-dry weight, which is better than average for a lodgepole pine type. However, about 70 percent of the production was concentrated in one species - Xerophyllum tenax (Table 1). Graminoid production was much lower than would normally be expected in a lodgepole pine type - only three percent of total production. Shrubs comprised 23 percent of the total production, but two species of Vaccinium contributed practically all of the herbage in this category. Forty-four plant species were recorded on the unburned area: 6 graminoids, 29 forbs, and 9 browse species. About 90 percent of the total production was contributed by five species: Xerophyllum tenax, 69 percent; Vaccinium caespitosum, 13 percent; V. scoparium, 7 percent; Thermopsis montana, 5 percent; and Spirea betulifolia, 3 percent. Only 11 of the 44 species occurred on the study plots. The remaining 33 species occurred on the study area but were outside the plots. These were listed as present but only the plants on the plots were used in computing production. A 100-percent cover of vegetation and litter was recorded on the plots.

A rather cursory wildlife inventory was made on the unburned area. Wildlife species were recorded as present if they were seen or if they could be identified from tracks, droppings, nests, or burrows. Sixteen species were noted in the area, eight mammals and eight birds (Table 2). No attempt was made to rate the species for abundance, but there appeared to be a good population of elk and deer in the area. The robin and the Clark's nutcracker were the most common bird species.

Burned Area - 1967

Ten months after the fire, the burned area was practically a biological desert. Total herbage production was only 44 pounds per acre compared to 1000 pounds per acre on the unburned area. Species composition as well as production was adversely affected.

Only nine plant species were recorded on the burned area - one grass, six forbs, and two shrubs - as compared to the 44 species found on the unburned area. Shrubs showed the greatest susceptibility to fire, with only two species being recorded on the burned area compared to eight on the unburned area. Further, the two species present, Vaccinium scoparium and Spirea betulifolia, occurred only in trace amounts. Xerophyllum tenax produced 86 percent of the total herbage on the burn.

A dense stand of lodgepole pine seedlings did not materialize on the burn. Two seedlings were counted on the 40 plots, which equals a stand of about 450 trees per acre. The relatively poor stand was probably due to the extreme heat of the fire. Temperatures were such that duff, litter, and organic matter in the soil were largely destroyed. It is probable that much of the lodgepole pine seed, as well as seed of other plant species, was consumed in the fire.

Ground cover provided by vegetation and litter was 37 percent, or 63 percent less than was found on the unburned site. Cover consisted almost entirely of ash that had not been washed or blown off the area since the fire.

As with vegetation, wildlife on the burn was also severely reduced. Wildlife noted on the area consisted of a few elk (indicated by tracks), one robin, and one Oregon junco.

Burned Area - 1971

Four years following the fire a marked increase in vegetation had occurred (Table 1). Production increased from 44 pounds in 1967 to nearly 600 pounds in 1971. This equals 60 percent of the 1000 pounds per acre recorded on the unburned site. Xerophyllum tenax was still the dominant plant but comprised only 33 percent of the total production compared to 86 percent in 1967 and to 69 percent on the unburned site. The number of plants increased from nine to 30 in the 4-year period. Of the 30 species only eight were present on the plots in 1967; thus, 22 species either invaded the plots or germinated after 1967. Xerophyllum tenax and Epi-lobium angustifolium were the major producers, with 200 and 173 pounds

per acre, respectively. Calamagrostis rubescens and Vaccinium scoparium were the major grass and shrub species but neither contributed more than two percent of the total herbage produced.

Five young lodgepole pine trees were recorded on the plots in 1971 compared to the two recorded in 1967. This is equivalent to a stand of 1134 trees per acre or one tree per 38 square feet. This is by no means a "doghair" stand but is enough to insure that lodgepole pine will again dominate the area in future years.

Vegetation and litter on the burn increased by 23 percent during the 4-year period, but was still 40 percent below the cover on the unburned area. However, the 60 percent cover recorded in 1971 approaches the amount needed for adequate soil protection. In view of this, soil losses from the area in the future should be minimal.

The number of wildlife species on the burned area increased significantly from 1967 to 1971. Species noted or indicated in 1971 were deer, elk, yellow pine chipmunk, golden mantled ground squirrel, northern pocket gopher, Clark's nutcracker, robin, and an unidentified woodpecker. Although considerable habitat improvement has occurred on the burn, wildlife will still be adversely affected for several years in the future. Much of the burned area is far distant from cover; consequently, big game use will be confined largely to the periphery of the burn next to standing timber. This use pattern will continue until young lodgepole pine stands on the burn become tall enough and dense enough to provide cover for wildlife. Another factor that may adversely affect big game is the standing and fallen dead timber on the burn. The standing timber will eventually fall and may render much of the burn impassable to big game animals.

Summary

1. Initially, fire destroyed both vegetation and wildlife habitat.
2. A marked improvement in vegetation and wildlife habitat has occurred during the past four years.
3. Both vegetation and wildlife habitat are still below maximum potential, i.e., production is still less than on the unburned area, and cover requirements for wildlife are not being fully met.
4. Optimum vegetal and wildlife conditions will not be attained for another 10 to 20 years.

Recommendations

1. Continue the study for several years in order to determine plant and wildlife habitat trends.
2. In the future, spend more time inventorying wildlife on the burned and unburned areas and try to develop abundance ratings for wildlife species. This will aid in obtaining more accurate comparisons between burned and unburned areas.
3. Install permanent plots in the unburned area so that observations are made on the same points at each reading.
4. Remeasure all plots at 5-year intervals.

Table 1. Production in pounds per acre airdry weight, species composition, and vegetation and litter on burned and unburned sites. Flossie Lake Burn, 1967 and 1971.

Species Forbs	Unburned		Burned			
	1967		1967		1971	
	Prod. Lbs/A.	Comp. Percent	Prod. Lbs/A.	Comp. %	Prod. Lbs/A.	Comp. %
Xerophyllum tenax	693	69	38	86	200	33
Epilobium angustifolium	0	0	T	T	173	30
Astragalus paysonii	0	0	0	0	2	T
Viola spp.	0	0	0	0	T	T
Epilobium adenocaulon	0	0	0	0	47	8
Gayophytum nuttallii	0	0	0	0	9	2
Anaphalis margaritacea	0	0	0	0	1	T
Gnaphalium macounii	0	0	0	0	17	3
Cirsium spp.	0	0	0	0	T	T
Lupinus argenteus	0	0	2	5	15	3
Hieracium albertinum	0	0	0	0	T	T
Chimaphilla umbellata	3	T	0	0	1	T
Arnica cordifolia	0	0	1	2	14	2
Clematis spp.	0	0	0	0	T	T
Polygonum douglasii	0	0	0	0	T	T
Arenaria macrophyllum	0	0	0	0	1	T
Thermopsis montana	51	5	T	T	28	5
Unidentified	0	0	0	0	30	5
Trillium ovatum	3	T	0	0	0	0
Mimulus guttatus	0	0	T	T	0	0
Castilleja spp.	T	T	0	0	0	0
Fragaria virginiana	T	T	0	0	0	0
Geranium viscosissimum	T	T	0	0	0	0

Table 1. Flossie Lake Burn, 1967 and 1971 (Cont.)

Species Forbs (Cont.)	Unburned		Burned			
	1967		1967		1971	
	Prod. Lbs/A.	Comp. Percent	Prod. Lbs/A.	Comp. %	Prod. Lbs/A.	Comp. %
Agoseris aurantiaca	T	T	0	0	T	T
Eriophyllum lanatum	T	T	0	0	0	0
Antennaria rosea	T	T	0	0	0	0
Solidago multiradiata	T	T	0	0	0	0
Achillea millefolium lanulosa	T	T	0	0	T	T
Hieracium albiflorum	T	T	0	0	0	0
TOTAL	750	74	41	93	538	91
<u>Grass and Grasslike</u>						
Calamagrostis rubescens	24	2	3	7	11	2
Festuca idahoensis	T	T	0	0	0	0
Poa nervosa	T	T	0	0	T	T
Carex geyeri	5	1	0	0	5	1
Carex rossii	0	0	0	0	7	1
Carex concinnoides	T	T	0	0	0	0
TOTAL	29	3	3	7	23	4
<u>Shrubs</u>						
Vaccinium caespitosum	125	13	0	0	6	1
Vaccinium scoparium	73	7	T	T	13	2
Spirea betulifolia	22	3	T	T	5	1
Rosa spp.	2	T	0	0	0	0
Pyrola secunda	1	T	0	0	0	0
Salix spp.	0	0	0	0	T	T
Arctostaphylos uva-ursi	T	T	0	0	0	0
Berberis repens	T	T	0	0	0	0
Shepherdia canadensis	T	T	0	0	0	0
Lonicera involucrata	0	0	0	0	T	T
Alnus sinuata	0	0	0	0	T	T
TOTAL	223	23	T	T	24	4
GRAND TOTAL	1002	100	44	100	590	100
Vegetation and Litter		100		37		60
Bare Ground		0		63		40

Table 2. Wildlife species noted in unburned lodgepole pine area adjacent to Flossie Lake Burn.

Mammals

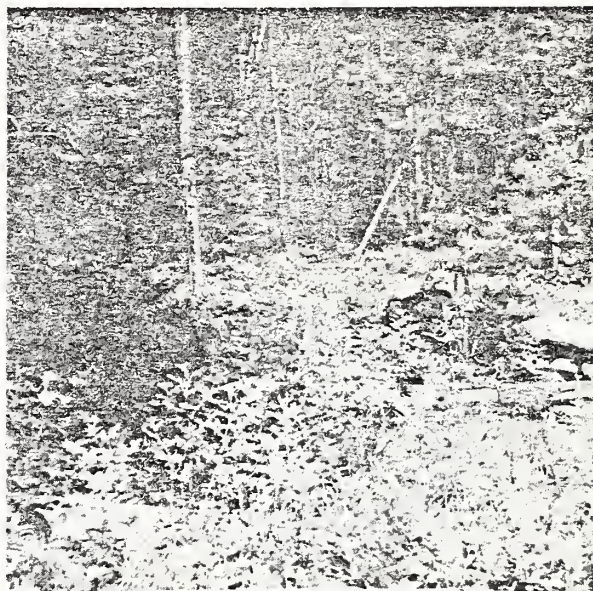
Elk
Deer, whitetail
Deer, mule
Chipmunk, yellow pine
Red Squirrel
Golden mantled ground squirrel
Northern pocket gopher
Least chipmunk

Birds

Evening grosbeak
Black-headed grosbeak
Clark's nutcracker
Robin
Flycatcher
Western tanager
Red crossbill
Goshawk



1. General view of Chamberlain Basin Douglas fir and lodgepole pine.



2. Understory vegetation in unburned area adjacent to burn. Production 1000 pounds per acre airdry weight.



3. Burned area approximately 10 mos. after fire. Production 40 pounds per acre airdry weight.



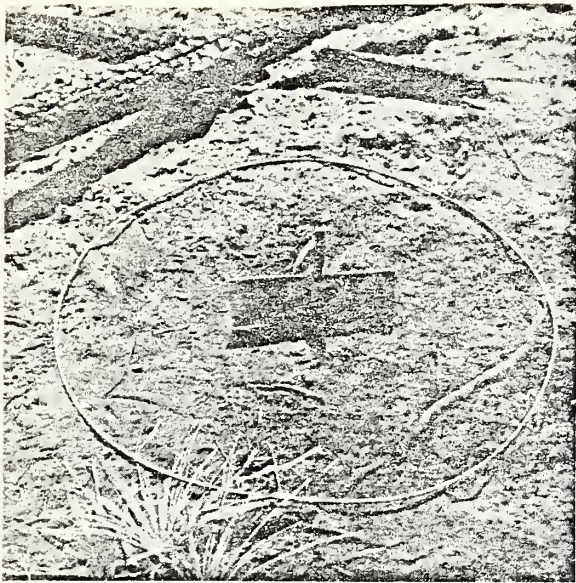
4. Burned area 4 years after fire. Production approximately 100 pounds per acre airdry weight.



5. Burned plot W-9 ten months after fire.



6. Burned plot W-9 four years after fire. Lodgepole pine reproduction about 1100 trees per acre.



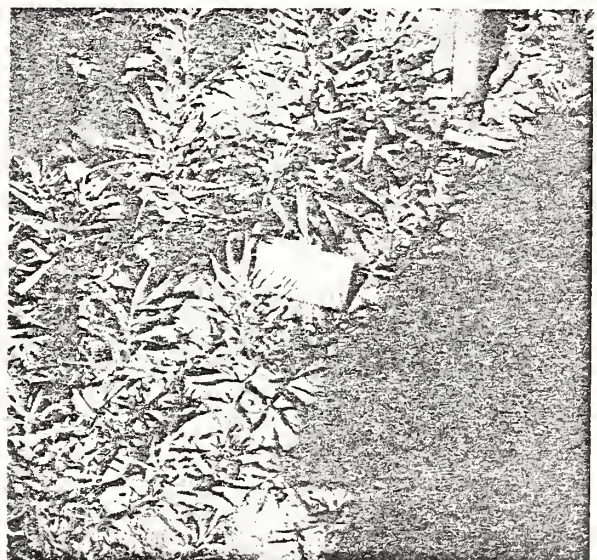
7. Plot W-20 ten months after fire.



8. Plot W-20 four years after fire.



9. Understory vegetation in unburned area adjacent to burn. Beargrass is the dominant species.



10. Plot W-5 four years after fire showing fireweed, which made the greatest gain in production of all species, increasing from a trace in 1967 to 173 pounds per acre in 1971.

FORMER ARMY ENGINEER SCIENTIST RECEIVES PATENT FOR CONTROL OF PLANTS BY LASER*

Dr. Ralph A. Scott, Jr., a former Army Corps of Engineers scientist, today received a United States Patent (3,652,844) for his invention of a device and method for destroying water hyacinths and other water plants by means of laser energy.

The presentation was made by Lieutenant General F. J. Clarke, Chief of Engineers, who also presented Dr. Scott a check for \$150 awarded under the Army Incentive Awards Program.

Dr. Scott, now employed as Chief Chemical Scientist for the Department of Defense Explosives Safety Board, has signed a license granting use of the laser beam eradication method to Federal, State and local Governments on a royalty-free basis.

Scott's invention utilizes laser energy for selective eradication of plant life in water as well as on land. He said that by selection of the proper level of laser energy weed control may be effected for land plants, such as along highway and railroad rights-of-way, and aquatic plants at the water surface for suspended and bottom-rooted aquatic plants.

"Since no chemicals are released into the environment, the problem of air and water pollution is avoided," Dr. Scott said.

According to Scott, a laser device generates a laser beam which is directed upon mirrors which in turn diverges the beam to a desired angle and directs it to the target area. The plant life is wilted almost immediately after irradiation, and is completely destroyed in 8 to 12 weeks.

*December 18, 1972 Department of the Army News Release

There aren't any rules for success

That work unless you do.

